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PATENT COOPERATION TREATY

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P06233PC00		FOR FURTHER ACTION See Form PCT/IPEA/416	
International application No. PCT/SE 2003/001767	International filing date (day/month/year) 14-11-2003	Priority date (day/month/year) 02-12-2002	
International Patent Classification (IPC) or national classification and IPC H04L12/56, H04L29/02			
Applicant OPERAX AB ET AL			

- This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 3 sheets, including this cover sheet.
- This report is also accompanied by ANNEXES, comprising:
 - ☒ (sent to the applicant and to the International Bureau) a total of 6 sheets, as follows:
 - ☒ sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
 - ☐ sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.
 - ☐ (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

- This report contains indications relating to the following items:

<input checked="" type="checkbox"/>	Box No. I	Basis of the report
<input type="checkbox"/>	Box No. II	Priority
<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input type="checkbox"/>	Box No. IV	Lack of unity of invention
<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/>	Box No. VI	Certain documents cited
<input type="checkbox"/>	Box No. VII	Certain defects in the international application
<input type="checkbox"/>	Box No. VIII	Certain observations on the international application

Date of submission of the demand 07-06-2004	Date of completion of this report 08-03-2005
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. +46 8 667 72 88 Form PCT/IPEA/409 (cover sheet) (January 2004)	Authorized officer Ralf Boström /LR Telephone No. +46 8 782 25 00

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE 2003/001767

Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This report is based on a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of:

- ☐ international search (under Rules 12.3 and 23.1(b))
☐ publication of the international application (under Rule 12.4)
☐ international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

☐ the international application as originally filed/furnished

☒ the description:

pages 1-6, 8-21 as originally filed/furnished

pages* 7 received by this Authority on 19-10-2004

pages* _____ received by this Authority on _____

☒ the claims:

pages _____ as originally filed/furnished

pages* _____ as amended (together with any statement) under Article 19

pages* 22-26 received by this Authority on 19-10-2004

pages* _____ received by this Authority on _____

☒ the drawings:

pages 1-2 as originally filed/furnished

pages* _____ received by this Authority on _____

pages* _____ received by this Authority on _____

☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. ☐ The amendments have resulted in the cancellation of:

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (specify): _____

☐ any table(s) related to the sequence listing (specify): _____

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

☐ the description, pages _____

☐ the claims, Nos. _____

☐ the drawings, sheets/figs _____

☐ the sequence listing (specify): _____

☐ any table(s) related to the sequence listing (specify): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/SE 2003/001767

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>1-35</u>	YES
	Claims	<u>---</u>	NO
Inventive step (IS)	Claims	<u>1-35</u>	YES
	Claims	<u>---</u>	NO
Industrial applicability (IA)	Claims	<u>1-35</u>	YES
	Claims	<u>---</u>	NO

2. Citations and explanations (Rule 70.7)

The present application is concerned with a problem that prior art solutions for resource management do not support a uniform service management or a general resource management for different protocol layers.

Documents cited in the International Search Report:

D1. EP 1089506 A2

D2. KEN-ICHI SATO et al.: "GMPLS-Based Photonic Multilayer Router (Hikari Router) Architecture: AN overview of Traffic Engineering and Signalling Technology", IEEE Communications Magazine, March 2002.

D3. EP 1113628 A2

The claimed invention differs from D1, which is considered to represent the most relevant state of the art, in that the different types of Network Resource Managers (NRMs) comprise means for communicating on a common network level. The cited prior art does not give any indication that would lead a person skilled in the art to include this feature in the systems described in D1. Therefore, the claimed invention is not obvious to a person skilled in the art. Accordingly, the invention defined in claims 1-35 is novel and is considered to involve an inventive step. The invention is industrially applicable.

supporting various kinds of overlay networks and link-layer technologies. As mentioned above the prior art solutions provide either a single level IP resource management or strict link-level resource management, which implies that it is neither possible to have a uniform service management nor a general resource management for different layers.

Thus, the object of the present invention is to provide a general resource management extending different protocol layers.

The above stated object is achieved by means of a network according to claim 1, a method according to claim 18 and a computer program product according to claims 34 and 35.

Further embodiments of the present invention is set forth by the depending claims.

The data network according to the present invention, comprising a first group of Network Resource Managers, NRMs, arranged to control the resources of the first network level and a second group of NRMs arranged to control the resources of the second network level, wherein the NRMs of the first group and second group comprise means for exchanging resource requests by using the first addressing scheme, and wherein the NRMs of the second group further comprise means for performing an address mapping between the first and second addressing schemes, makes it possible to provide a general resource management extending different protocol layers.

The method according to the present invention, comprising the steps of controlling the resources of the first network level by a first group of Network Resource Managers, NRMs, and controlling the resources of the second network level by a second group of NRMs, exchanging resource requests

Claims

1. Data network implemented by a first network level (104) having a first
addressing scheme and at least a second network level (108) having a
second addressing scheme each network level provides connectivity over
at least one network domain, the data network is **characterised in** that a
first group of Network Resource Managers, NRMs, (b-d)) is arranged to
control the resources of the first network level and a second group of
NRMs (e-g) is arranged to control the resources of the second network
level, wherein the NRMs of the first group (b-d) and second group (e-g)
comprise means for communicating on a common network level and for
exchanging resource requests by using the first addressing scheme,
wherein the NRMs (e-g) of the second group further comprise means for
performing an address mapping between the first and second addressing
schemes.
2. Data network according to claim 1, wherein the first network level is the
Internet Protocol, IP, layer.
3. Data network according to any of claims 1-2, wherein the second
network level is a link protocol layer.
4. Data network according to claim 2, wherein the second network layer is a
second protocol layer controlling an overlay network on top of said IP
layer.
5. Data network according to claim 2, wherein the second network layer is a
second IP layer controlling an overlay network on top of said IP layer.
6. Data network according to claim 5, wherein it further comprises a third
network level having a third addressing scheme, the resources of said
third protocol layer is controlled by a third group of NRMs comprising
means for exchanging resource requests with NRMs of the first network
level using the first addressing scheme.

7. Data network according to any of claims 1-6, wherein the NRMs of the third group further comprise means for performing an address mapping between the first and third addressing schemes.
- 5 8. Data network according to claim 6 when dependent on claim 3, wherein the third network layer is a third protocol layer controlling an overlay network on top of said IP layer.
9. Data network according to claim 6 when dependent on claim 3, wherein the third network layer is a second IP layer controlling an overlay network on top of said IP layer.
- 10 10. Data network according to claim 6 when dependent on claim 3, wherein the third network layer is a third protocol layer controlling an overlay network on top of said IP layer.
11. Data network according to claim 6 when dependent on any of claims 4-5, wherein the third network layer is a link protocol layer.
- 15 12. Data network according to any of claims 1-10, wherein the NRMs within at least one of said groups are arranged in a hierarchical structure arranged to communicate with each other.
13. Data network according to any of claims 1-11, wherein each of the NRMs is a logically centralised unit in a network.
- 20 14. Data network according to claim 12, wherein said logically centralised unit is distributed or backed up over several physical servers
- 25 15. Data network according to any of claims 1-13, wherein the data network in at least one of the network levels comprises a Network Controller (NC) comprising means for receiving a request from an NRM and means for obtaining detailed information such as topology maps, traffic measurement information, alarms of the network domain that is controlled by said NRM in response to said request.
- 30 16. Data network according to claim 14, wherein the data network in at least one of the network levels comprises a Device Controller (DC) comprising means for receiving a request from the NC and means for controlling vendor specific node technologies in response to said request.

17. Data network according to claim 15, wherein the DC is co-located with the NC in at least one of the network domains.

18. Method in a data network implemented by a first network level having a first addressing scheme and at least a second network level having a second addressing scheme each network level provides connectivity over at least one network domain, the method is **characterised in** that it comprises the steps of:

-controlling (201) the resources of the first network level by a first group of Network Resource Managers, NRMs, and

-controlling (202) the resources of the second network level by a second group of NRMs, wherein the first group and the second group of NRMs comprises means for communicating on a common network level,

-exchanging (203) resource requests between NRMs of the first and second group by using the first addressing scheme, and

-performing (204) an address mapping between the first and second addressing schemes.

19. Method according to claim 18, wherein the first network level is the Internet Protocol, IP, layer.

20. Method according to any of claims 19, wherein the second network level is a link protocol layer.

21. Method according to claim 19, wherein the second network layer is a second IP layer controlling an overlay network on top of said IP layer.

22. Method according to claim 19, wherein the second network layer is a second protocol layer controlling an overlay network on top of the IP layer.

23. Method according to any of claims 18-22, wherein the data network further comprises a third network level having a third addressing scheme and the method comprises the further step of:

-controlling the resources of said third protocol layer by a third group of NRMs and

-*exchanging* resource requests between any of the NRMs of the first and second network level using the first addressing scheme.

24. Method according to claim 23, wherein it further comprises the step of:
performing an address mapping between the first and third addressing schemes.

25. Method according to claim 24 when dependent on claim 19, wherein the third network layer is a third protocol layer controlling an overlay network on top of the IP layer.

26. Method according to claim 24 when dependent on claim 19, wherein the third network layer is a second IP layer controlling an overlay network on top of said IP layer.

27. Method according to claim 24 when dependent on any of claims 20-21, wherein the third network layer is a link protocol layer.

28. Method according to any of claims 18-27, wherein the NRMs within at least one of said groups are arranged in a hierarchical structure arranged to communicate with each other.

29. Method according to any of claims 18-28, wherein each of the NRMs is a logically centralised unit in a network.

30. Method according to claim 29, wherein said logically centralised unit is distributed or backed up over several physical servers

31. Method according to any of claims 18-30, wherein the data network in at least one of the network levels comprises a Network Controller (NC), wherein the method comprises the further steps of:

-*receiving* by the NC a request from an NRM and

-*obtaining* detailed information such as topology maps, traffic measurement information, alarms of the network domain that is controlled by said NRM in response to said request.

32. Method according to claim 31, wherein the data network in at least one of the network levels comprises a Device Controller (DC), wherein the method further comprises the step of:

-*receiving* by the DC a request from the NC and

-*controlling* vendor specific node technologies in response to said request.

33. Method according to claim 32, wherein the DC is co-located with the NC in the at least one of the network domains.

5 34. A computer program product directly loadable into the internal memory of a computer within a router or a server in a data network, comprising the software code portions for performing the steps of any of claims 18-33.

10 35. A computer program product stored on a computer usable medium, comprising readable program for causing a computer, within a router or a server in a data network to control an execution of the steps of any of the claims 18-33.